ABUNDANCE OF *ATTA CEPHALOTES* IN PRIMARY AND SECONDARY FOREST

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Abstract. (NDP) As compared to primary forests, secondary forests are characterized by greater abundances of early successional species such as *Ochroma lagopus*. Such species are preferred by *Atta cephalotes*, and therefore we predicted that secondary forests would contain greater abundances of these leaf cutter ants. We found that two 3.5 km transects in primary and secondary forests contained significantly different numbers of active *A. cephalotes* trails, means for 100 m sections 0.49 (± 0.27 SE) and 1.71 (± 0.33) respectively. Thus it appears that *A. cephalotes* found in higher numbers in secondary forests, perhaps because they which provide a greater abundance of preferred plant resources than primary forests.

INTRODUCTION (SDK)

Leaf cutter ants, *Atta cephalotes*, preferentially harvest plant species which facilitate fungal growth. Plant species composition differs in primary and secondary forests. Due to different histories of land use and disturbance, a wider range of successional tree species, from pioneers to persistents, exists in secondary forests. Pioneer species are more common in secondary forests due to the higher light levels and increased number of canopy gaps in the more recently disturbed habitat.

We hypothesized that the abundance of *A. cephalotes*, would vary between primary and secondary forest habitats for three reasons. First, Balser et al. (1992) demonstrated that *A. cephalotes* are selective, preferring gap species over canopy understory species. Second, Nichols-Orians (1991) found that these ants preferentially select leaves from plants of the same species which have been grown in high light conditions. Finally, Bergholtz et al. (1991) showed that *A. cephalotes* will harvest *Ochroma lagopus* (balsa), a characteristic species of second growth forests (Whitmore 1983), over other plant and tree species. Because *A. cephalotes* seems to prefer gap species, particularly balsa, and plants grown in high light conditions, all of which are more common to secondary forests than primary forests, we predicted that the abundance of *A. cephalotes* would be greater in secondary forests.

METHODS (SDK)

We searched for foraging trails of *A. cephalotes* in the forest surrounding the Estación Sirena, Corcovado National Park, Costa Rica. Trail transects were walked from 0730 to 1100 on 30 January 1995.

We sampled *A. cephalotes* foraging trails in primary and secondary forest habitats. The primary forest transect ran for 3.5 km along the Sendero Ollas. The secondary forest transect ran for 3.5 km along portions of the Senderos Espavale, Sirena, and Guanacaste. Transects were divided into 35 100 m sections. Within the 100 m sections, we recorded the number of active *A. cephalotes* foraging trails. We summed the total number of trails per section for each of the 35 100 m sections in both forest habitats. We then used these 35 values and calculated the mean number of trails per 100 m for the primary and secondary forests.

Although each ant trail does not correspond to an independent ant colony, we assumed that the number of foraging trails was proportional to the abundance of ants in a local area. Thus we used numbers of ant trails as an estimate of relative ant abundance for a transect region.

RESULTS (NDP)

We found 17 active *A. cephalotes* trails in the primary forest and 60 active *A. cephalotes* trails in the secondary forest. There was a significant difference in the mean number of *A. cephalotes* trails per 100 m sections in the primary forest and the secondary forest (t=-2.770, df=34, P=0.009; Fig. 1).

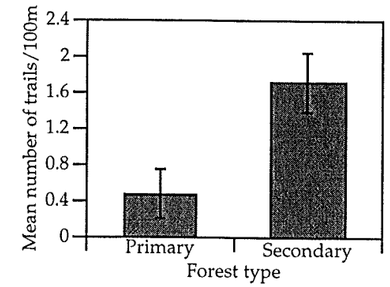

FIG 1. Mean number of *A. cephalotes* trails/100 m (± SE) in primary and secondary forest., n=35, 100 m sections in each forest type. Means were significantly different between the two forests (P=0.009).

DISCUSSION (JAK & NEP)

Our hypothesis, that a significantly higher number of *A. cephalotes* trails will be found in secondary forest relative to primary forest, was supported. The varying distribution and abundance of preferred canopy and understory plant species, i.e., greater abundance of *O. lagopus* in secondary forest, may account for some of the variation in *A. cephalotes* abundance between primary and secondary forest. Furthermore, *A. cephalotes* harvests *Aphelandra* sp., a successional understory species rarely found in primary forest (pers. obs.). If other preferred understory and canopy plant species are also early successional, their abundance may also be greater in secondary forest.

Variation in light intensity and depth of the litter layer between primary and secondary forest may also affect *A. cephalotes* abundance. *A. cephalotes* activity increases with increasing temperature and light intensity (Kohl et al. 1991). Both temperature and light intensity should be higher in secondary forest where more sunlight penetrates the sparser canopy. In addition, we observed that the depth of the litter layer was greater in primary forest as compared to secondary forest. *A. cephalotes* may have greater difficulty constructing trails in the more dense leaf litter of the primary forest.

Further investigation of the distribution and abundance of preferred plant species in primary and secondary forest may help explain the difference in *A. cephalotes* abundance between the two habitats. Future study should also examine the effects of litter layer depth on trail construction. Furthermore, examination of light intensity and decomposition rates in primary and secondary forests may also help explain the greater abundance of *A. cephalotes* in secondary forest.

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